

PILOT'S PROFICIENCY TEST

B-25, Series C & D, Aeroplanes
12th Bombardment Group (M) AAF

SUBMITTED BY:

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SECTION I : AIRPLANE GENERAL

1. a. WING: Consists of 3 sections. The center section is permanently attached to the fuselage and containing self sealing fuel and oil tanks and having a positive dihedral of approx $4\frac{1}{2}^{\circ}$. There are 2 removable outer wing panels with detachable tips - containing hydraulically operated trailing edge slotted flaps and booster and controllable trim tab ailerons.

b. EMPENNAGE: Double Fin and Rudder Type. Elevator and rudder combination booster and controllable trim tab equipped.

c. SURFACE CONTROL SYSTEM: Consists of cables, sectors, and push pull rods. All control surfaces may be locked at pilot's station. An elevator bumper is installed to make plane more stable.

d. FUSELAGE ARRANGEMENT: Compartments are in following order from front to rear: bombardiers, pilots and bombardier's crawlway, navigator's, bomb bay and passageway front to rear, Radio operators with bottom and top turret, camera, and tail.

e. LANDING GEAR: Fully retractable, hydraulically operated, ~~triangle~~ type.

f. EMERGENCY LOWERING SYSTEM: Two types in use - Mechanical and Hydraulic. Mechanical system employs an operating arm and screw in radio operator's compartment which puts tension on cables attached to main landing gear. Nose wheel is lowered by a cable attached to a spring loaded, hand operated drum in navigator's compartment. Hydraulic system employs a hand operated auxiliary hydraulic

pump located in the navigator's compartment.

g. NOSE GEAR: Swivel type, strut having shimmy damper and centering device which is releasable for towing purposes.

h. INDICATORS: (1) Warning horn for wheels not down and locked when throttles are retarded. (2) Autosyn position indicator indicates landing gear up, ~~down~~ down, and locked positions, and wing flap position. (3) Nose wheel turn indicator indicates when nose wheel is turned more than 15° off center.

i. WHEELS & BRAKES: Main Gear - 47 inch, smooth contour wheels with puncture proof tubes. Nose Wheel - 30 inch, smooth contour wheel with dual seal tubes. Brakes - dual disk hydraulically operated by toe type pedals. Parking brakes and emergency air brakes are provided. Air pressure of 500-600 $\text{#}/\text{in}^2$ maintained in air system.

j. GENERAL HYDRAULIC SYSTEM: Single system concurrently operates main and nose landing gear, and selectively operates wing flaps, engine cowl flap, bomb bay doors, and brakes. Automatic valve keeps pressure in system between 800 and 1000 $\text{#}/\text{in}^2$. Emergency relief valve opens at 100 to 1200 $\text{#}/\text{in}^2$. Pressure is supplied by an engine driven pump, one on each engine, connected to the system in parallel. Two pressure accumulators provided in navigator's compartment, one for general supply system and one for brake system only. An emergency hand pump and selector valve is provided for pumping pressure to general system, to brakes, and to landing gear down position latch.

2. DIFFERENCES BETWEEN B-25 MODELS NOW IN GROUP

- a. Armament: on some ships the lower turret has been omitted and various type waist guns installed. Some ships equipped with a scale machine gun in the tail. On most of the later planes mechanical gun chargers have been installed on the turret guns eliminating the old hydraulic chargers. Many small ^{factory} changes have taken place from time to time in the turret mechanism.
- b. Fuel System: Some planes are equipped with auxiliary wing tanks, others are not. In some ships, a fuel transfer system is used to transfer gas from one wing to the other while in others a crossfeed system is used.
- c. Emergency Landing Gear Lowering device: Some ships equipped with the mechanical lowering type while others (newer ships) are equipped with an aux. emergency hydraulic system for lowering the landing gear.
- d. Energizers - Some planes have engines equipped with energizers that must be held on for 30 sec. before meshing whereas others are only energized for 5 sec.
- e. Misc. Driftmeters in the newer planes are ~~B-5~~ B-5 type without the gyro whereas in the older planes are the B-3 type with the gyro. Copilot Seat in the newer planes is cut off and the armor plate moved back to the bulkhead to facilitate a quick emergency bail out. Tow Target Slots are cut into the bomb bay doors of a few aeroplanes. Automatic Pilots are in some planes, others are equipped for them, and still others have none. Landing Lights in some planes are sealed beam type and in others are the globe and reflector type.

Carburetors in some planes are equipt with internal screens while in others the screens are external - Identification and other night flying lights are arranged differently on different planes.

SECTION II - POWER PLANT GENERAL

1. Engines are model R-2600-13, 14 cyl., double row, Wright Cyclone.

2.		BRAKE HP 1700	RPM 2600	ALT. 4500'
a.	Military Rated Power -	1450	2600	12,000'
b.	Normal " "	1500	2400	6,700'
c.	Maximum Cruising -	1125	2100	6,000'
d.	Desired Cruising (67%) -	1005	2100	6,000'
e.	" " (60%) - (29.7 in. Hg)		1965	6,000'
f.	Cruise for Min. spec. fuel flow - (24-26 in Hg)		1500	4-6000'

3.	a. ²⁶⁰⁰ 2400 RPM - ⁴⁴ 37.8 in. Hg.
	b. 2400 " - 37.8 " "
	c. 2080 " - 32 " "
	d. 2000 " - 30 " "
	e. 1965 " - 29.7 " "
	f. 1500 " - 24 " "

4.

No.	ITEM	a. TAKE OFF	b. CLIMB	c. CRUISE (67%)	d. CRUISE (60%)
(1)	R.P.M.	2600 (one Min.)	2400 max.	2100	2000 - 1550
(2)	Manifold Pressure	44 in. Hg.	38 in. Hg.	29.5 - 31.5 in. Hg.	27 in. Hg.
(3)	Fuel Pressure	6-7 #/in ²	→	→	→
(4)	Oil Pressure	80-90 #/in ²	→	→	→
(5)	Oil Temperature	60°-95° C	60°-95° C	60°-85° C	60°-85° C
(6)	Cylinder Head Temp.	150°-260° C (5min max)	260° C (15min max)	150° C - 205° C	150° - 205° C
(7)	Position of Cowb Flaps	open	open if necessary	 closed	closed
(8)	" " Oil Shutters	open	open	Adjust to Oil Temp. →	bet. 60° C & 85° C
(9)	Mixture Controls	Full Rich	Full Rich	Full Rich	Cruising lean
(10)	Propeller Controls	Full low Pitch	2400 RPM	2100 RPM	2000-1550 RPM

5. Cruising Lean can be used up to 60% power.

a. Highest Manifold pressure = 29.7@sea level to 26@12000'

b. Highest RPM = 1965

6. For long range cruising mixture controls are individually leaned out by pulling the control back until the engine coughs then it is eased forward until the engine runs smoothly again. The T.O. explaining the operation of engines using long range cruising dices has been recinded and this practice is no longer recommended.

Do not go past cruising lean

7. When engines are not running mixture controls should be left in the Idle Cut Off position to prevent the engines starting should the mag switch and battery Disconnects be turned. In Idle Cut Off the engines get no gas.

8. It is necessary to pull the propellers through 4 revolutions if the engines have been standing more than 2 hours -
or until engine cools

9. STARTING ENGINES

(1) Head airplane into wind.

(2) Nose gear towing pin engaged.

(3) Emergency nose gear operating pawl control "OFF"

(4) Main gear, flap, and bomb door emergency controls stowed.

(5) Check emergency ~~fuel shutoff~~ brake air pressure (550-600 #/in²) ~~check~~

(6) Three emergency escape hatches unlocked.

(7) Check ignition switches "OFF" and set parking brake.

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- (8) Unlock flying controls and check operation.
 - (9) Remove and stow locks on hydraulic controls.
 - (10) If inoperative for 2 hours, turn propellers by hand 3 or 4 revolutions (ignition "OFF")
 - (11) Open throttles $\frac{1}{2}$ inch (700-800 RPM)
 - (12) Propellers full "increase RPM."
 - (13) Mixture "full rich."
 - (14) Supercharger "low" (locked).
 - (15) Oil cooler shutters "closed".
 - (16) Carburetor air "normal"
 - (17) Cowling flaps "open".
 - (18) Fuel cross-feed and bomb bay tank transfer valve "off".
 - (19) Emergency fuel shut-off valves "on";
 - (20) Switch "on" battery disconnects, generators, ignition safety, ignition and active inverter switches.
 - (21) Booster pump "on" (fuel pressure 6-7 #/in²)
 - (22) Prime 3-5 seconds if cold, 2 sec if hot.
 - (23) Starter energizing switch "on" (30 sec. minimum on old planes and 5 sec on new), then engaging switch "on". If engines fail to start due to cold, use hand crank to fully energize, then press engaging switch "on", followed by energizing switch "on"; then hold both "on".
 - (24) Prime while engaging as required.
 - (25) As engines start, check oil pressure. If not 40 #/in² after 30 sec., stop engines and investigate. Warm engines at 1200 RPM until oil temp. shows appropriate increase and oil pressure remains steady when throttles are open.

a definite increase and oil pressure remains steady when throttles are opened.

- (26) Booster pumps "off" (fuel pressure 6 to 7 $\text{#}/\text{in}^2$)
- (27) Open oil cooler shutters at oil temp. of 40°C .
- (28) Check elevator, ailerons and rudder trim.
- (29) Check propeller control and flap operation.
- (30) Check L. and R. Magnetos at 1800-2000 RPM, maximum manifold pressure 27 to 31.5 in. Hg., max. R.P.M. drop of 75. If greater run at same R.P.M. for 15 sec. and recheck.
- (31) Check all fuel levels.
- (32) At 1800 RPM check volts, 28 to 28.5, amps 40 to 60 max, and suction 3.75 to 4.25 in. Hg.

10. 1200 RPM is used for warming up engines.

11. To check whether oil is circulating properly oil pressure should be 40 $\text{#}/\text{in}^2$ after 30 sec. and the oil temp. should show a definite increase and when the throttles are changed the oil pressure should remain steady.

12. Magnetos should be checked at 1800-2000 RPM, maximum manifold pressure 27 to 31.5 in. Hg., max. R.P.M. drop 75. If greater, run engine at same R.P.M. for 15 sec and recheck.

13(a) When increasing power, increase the RPM

and then the manifold.

b. When decreasing power, decrease the manifold pressure then decrease the R.P.M.

c. In either case if a large movement is made go thru the ~~the~~ above routine in small increments of the total movement.

14. For take-off and landing the mixture control is set at "Full Rich".

15. The proper setting for landing is 2100 RPM. This limit should not be exceeded because at the low manifold pressures of a normal landing ^{a higher RPM} would be too high and still a high enough RPM must be maintained in the event that it is necessary to go around and more power is needed.

16. The cowl flaps are closed for cruising and landing because the engines aren't operating at max or near max HP and the engines remain cool enough. Cowl flaps are open on take off because engines are operating at near max RPM and more air is needed to cool them at that comparatively slow speed.

17. The minimum idling speed permitted is 450 RPM, however, using the spark plug that are available 1000 RPM is more desirable as at that speed the plugs will not tend to foul up.

18. Max R.P.M. in a dive is 2880 -

19. & 20. To feather propellers, push propeller feathering control momentarily. To unfeather, set propeller control in "decrease RPM"; push feathering control and release at 800 RPM. During practice feathering operations in the air the propellers should not be left in the feathered condition more than 15 min. and then when engine is restarted care ~~to~~ should be taken not to overwork the engine while it is cold.

21. The carburetor air heat controls have two positions only: "Normal" and "icing conditions." Each control should be in the "normal" position except under the following conditions, since a loss of HP results with the controls in the "icing conditions" position, the effect increasing as horsepower is increased: when ever rain, snow, sleet, or visual icing, icing conditions are present and/or the gradual loss of manifold pressure and malfunction of the engine is observed without change of either throttle or altitude, and/or carburetor icing conditions are anticipated, the control should be set in the "icing conditions" position. In this position the air scoop entrance is closed off and a door is opened below the engine cowling and behind the cylinders where ice-free and heated air is obtained. The engine is not injured as a result of inadvertent operation in the "icing conditions" position even in warm weather, since the carburetor air temp. rise is small ($30-35^{\circ}\text{C}$).

Take off should be made with heat control in "normal" position in order to obtain maximum HP and in order to preclude any possibility of detonation. The doors will automatically assume the normal position if a control rod becomes severed.

22. The blower ratios are: Low 7.06/1, High 10.06/1

23. High blower may be used anytime between 11,000' and 13,000' when less than one inch of throttle movement is left.

24. It is not necessary to shift into high blower above 11,000 ft.

25. ¹⁴ 4% of total HP is lost when high blower is used at any altitude -

26. It would be possible to take off on a field at sea level in high blower but, ^{is} not good practice

27. The condition of 1600 RPM and 18 to 21 inches of mercury manifold pressure should be avoided.

28. Shutting Off Engines:

(1) If necessary use oil dilution system.

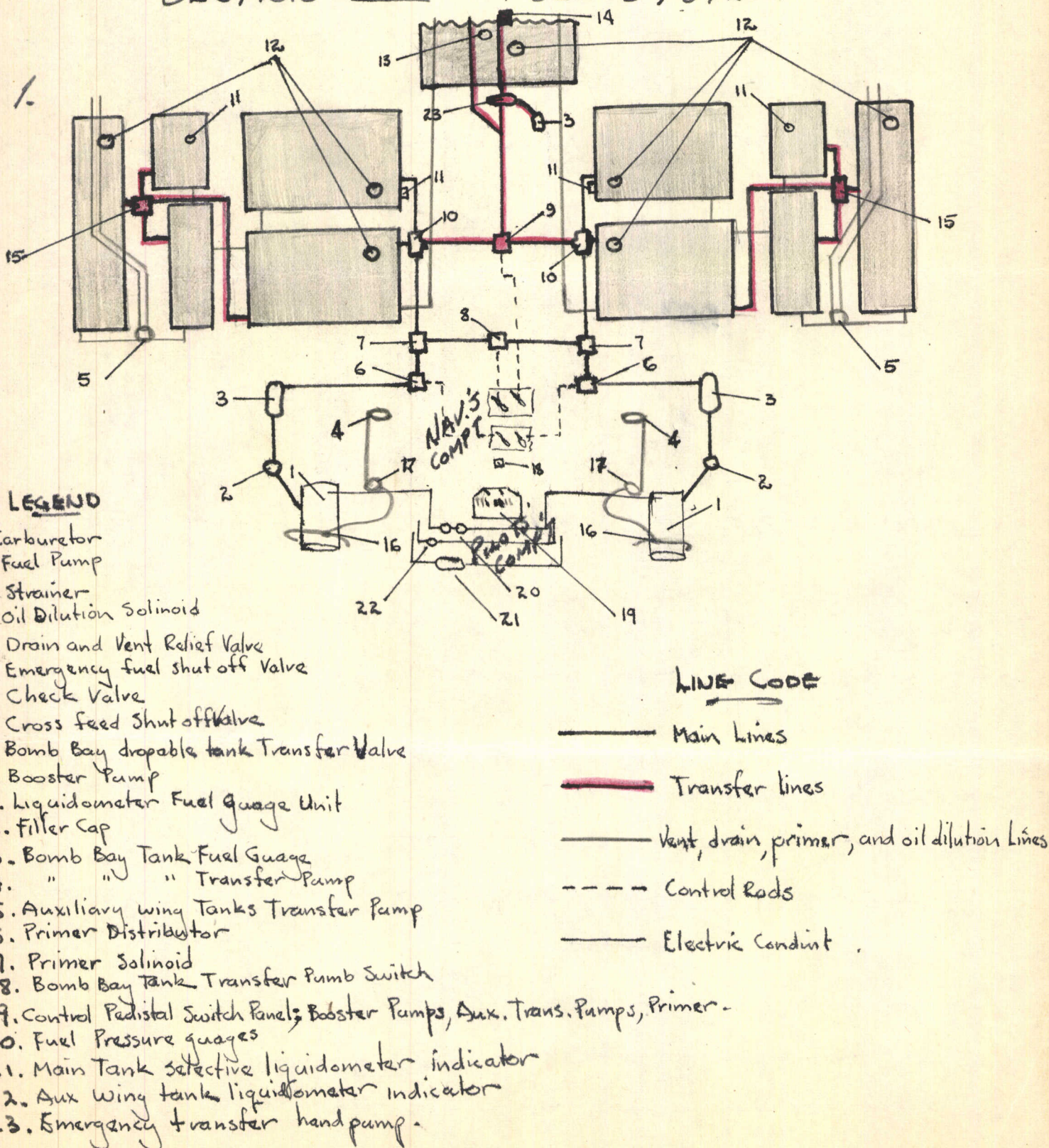
(2) Propellers at full "increase RPM"

(3) Idle at 600 to 800 RPM for 1 to 3 minutes, until cylinder head temperature is below 190°C

(4) Run at 1500 to 1600 RPM for 5 seconds, then move

mixture control to "idle cut-off" and at same time open throttles. Do not not move mixture control from "idle cut off".
(5) after engine stops, turn "off" all switches.

SECTION III = FUEL SYSTEM



2. The booster pumps should be turned "on" for starting the engines and for take off and landings. During flight the booster pumps should only be used to maintain fuel pressure as required. The engine driven fuel pumps are balanced so that their pressure regulation is not affected by the application of booster pump pressure. The boosters are electrically operated.

3. Altitude has nothing what ever to do with when the booster pumps should be turned on. See Question No. 2.
should be on below 1000 and above 10000

4. Total Capacity of Fuel Tanks (U.S. Gals), One Side Only.

Front Main ----- 184

Rear Main - - - - - 151

Bomb Bay Droppable - - - - - 585

Wing Auxiliary - - - - - 152

Doolittle (Half Bomb Bay) - - - - - 240

5. On some aeroplanes in order to transfer fuel from fuel tanks on one side of the aeroplane to the forward wing fuel tank on the opposite side it is first necessary to connect the tanks desired by means of the fuel transfer valves. Controls at rear of Navigator's Compartment after setting the fuel transfer valves move fuel flow direction switch in direction of desired flow and then set the transfer pump switch in the "on" position. A signal light in the center of the transfer pump control panel will indicate if pump is operating.

On other planes when the cross feed valve is open, fuel from either either front wing tank may be supplied

to the opposite engine or to both engines, using the booster pumps as flight conditions may require.

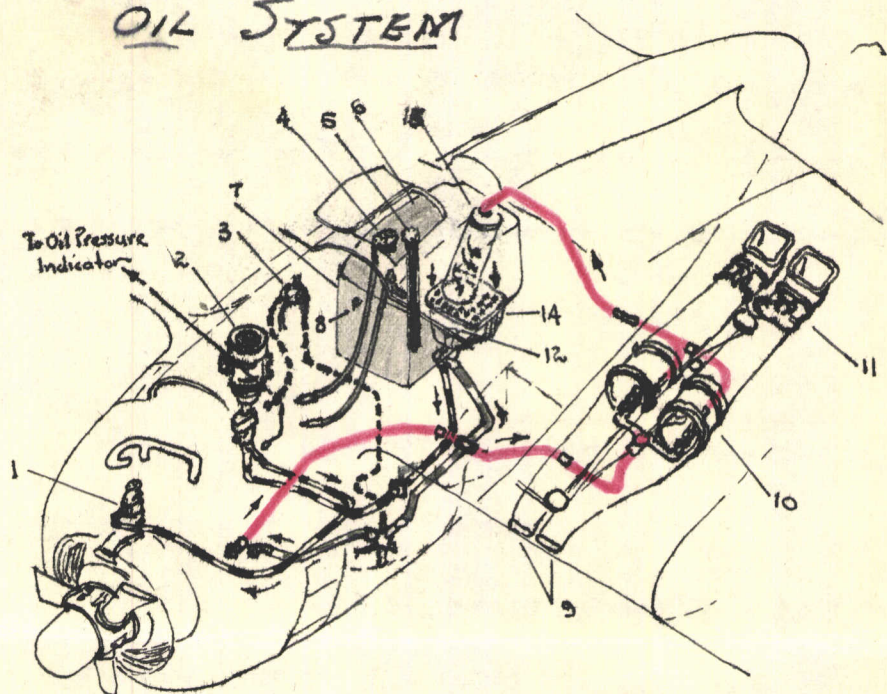
6. Fuel may be transferred to the wing tanks from the Doolittle bomb bay tank by selecting the tank to which you ~~wish~~ wish to transfer by use of the Bombay tank transfer valve then using the emergency transfer hand pump.

7. When the Stewart heater is in operation the fuel consumption is increased for the left engine.

OIL SYSTEM

LEGEND

1. Propeller Governor
2. Propeller Feathering Pump
3. Oil Dilution Solenoid
4. Filler Neck
5. Oil Level Indicating Rod
6. Self-Sealing Oil Tank
7. Oil Compartment
8. Max level Indicator Clip
9. Air Intake Duct
10. Oil Cooler
11. Shutters
12. Propeller Feathering Oil standpipe
13. Hopper Assembly
14. Sump



LINE CODE

Supply Line			Dilution Line
Return Line			Vent or Drain Line
Propeller Feathering line			Pressure Line
Engine Breather line			

2. On most planes the oil tanks are self sealing.
3. Oil tank capacity:
Self sealing - 37.5 gal (max)
Non-self sealing - 36.3 gal (max)
Both type - 21 gal (normal)
4. The grade of oil used is: British - No. 114
American - Army Navy Spec. 1120
5. Normal capacity each tank is 21 gal
Overload " " " is 37.5 gal in self sealing tank
" " " " 36.3 " "non" " "
6. The oil dilution solenoid valves are mounted on top of the firewall with a flexible conduit running to the power panel on the firewall and copper lines to the carburetor and oil dilution and drain valves.
The fuel is taken from the carburetor ~~and its dilution~~ thru the same "Y" fitting that connects to the fuel pressure line. The fuel is taken from the carburetor under fuel pressure thru the solenoid operated dilution valve and discharged in to the oil dilution and drain valve located in the oil inlet line at the bottom of the firewall.
7. The minimum oil temperature for take off is 47.5°C
8. The maximum oil temp. for desired cruising is 85°C
9. Tech. Orders call for oil change at engine change, however, in this group oil is drained at each 100 hr inspection.

10. The oil system is ~~vented~~ vented by two vent lines at the top of the integral oil compartment. ~~and~~
~~Ch engine Breather~~

11. To supply oil for feathering propellers when the engine oil supply is exhausted 1.3 gal reserve is provided in a stand pipe incorporated in the sump assembly.

a. ~~This provision is made in all types of B-25 aeroplanes.~~
~~not in later ones~~

SECTION IV - HYDRAULIC SYSTEM

1. The following parts of the B-25 aeroplane are hydraulically operated: landing gear, wing flaps, ~~control~~ flaps, bomb bay doors, brakes, some gun chargers, propellers pitch control, propeller feathering device, and auto-pilots.

2. The hydraulic reservoir has a capacity of 5.9 gal.

3. In the event that the supply of hydraulic fluid to the ~~the~~ engine driven pump is lost the hand pump is fed from a port in the bottom of the reservoir which holds a reserve of 2.5 gals.

4. The normal pressure in the general hydraulic system is 800-1100 #/in² and 1000-1200 #/in² in the brake hydraulic system.

5. A pressure drop in the brake system will cause a

pressure drop in the general hydraulic system but not vice versa -

6. It is important that hydraulic controls be returned to neutral after use so that in the event of a break in a line hydraulic fluid will not be pumped overboard.
7. The wing flaps can be operated hydraulically with the engine stopped by using the hand hydraulic pump with the selector valve in the normal position. Enough pressure remains in the accumulator of the general hydraulic system to facilitate the operation of the flaps in one direction.
8. Before making a normal landing 1000 #/in² brake hydraulic pressure should be available.

SECTION V - ELECTRICAL SYSTEM

1. The source of electric power on a B-25 type aeroplane is 2 - 24 volt, 34 amp hour, Type 61, lead plate storage batteries recharged by an engine driven generator on each engine.
2. The voltage of the electric system in general is between 27.5 and 28.5 volts.
3. The battery disconnect solenoids operated by a

switch on the pilots main switch panel cuts out all electrical equipment when switches are "OFF".

4. For normal operation both battery disconnect switches should be on.

5. The electrically operated instruments are as follows: fuel level indicators, landing gear and wing flap position indicator, nose wheel turn indicator, cylinder head temperature indicator, free air temperature indicator, oil temperature indicator, oil pressure indicator, fuel pressure indicator, tachometer, manifold pressure indicator.

6. The electrically operated instruments are called autosyn and electric instruments.

7. The voltage for operating the autosyn instruments is 26V and for operating the electric instruments is 110 volts.

8. The inverters are ~~the~~ for the purpose of transforming the 28 volt D.C. current of the generators to 115 volt, 400 cycle, A.C. and 26 volt 400 cycle A.C. current.

9. There are 2 inverters on the B-25 type aeroplane one is active and the other is a spare.

10. The units and accessories operating on 110 volts

are the fluorescent lights, driftmeter, electric gyro motors, and the radio compass receiver.

11. The main landing lights are focused with the right hand light up and the left hand light down so that the runway will be lit both on the approach and when the nose is raised to level out and land.
12. There are three colored lights on the bottom, amber, red, and green and a white light on top and bottom.
13. The ultra violet filter on the Pilot's cockpit fluorescent lights between the fluorescent lights and the instrument panel causes the fluorescent markings on the instruments to glow strongly without any usual illumination in the cockpit.
14. Booster coils burn out when Engines are engaged with the starter for too long a period while starting the engines.
15. 5 sec. is the maximum time that the starter engaging switch should be held on.
16. The generator main line switch should be left on all the time while aeroplane is in flight according to Tech. Orders, however, in order to save voltage regulators it is advisable to turn them off on takeoffs and landings and when the generators are not charging.

17. The maximum voltage for the B-25 type aircraft electrical power system is 28.5 volts.

SECTION VI EMERGENCY SYSTEMS

1. The emergency hydraulic lowering system is operated as follows:

- (1) Put the landing gear operating handle in the "down" position.
- (2) Unlatch the bail to release the emergency pump handle.
- (3) Operate emergency hand pump until gear is down and locked.

Note: The first stroke of the pump must be a full stroke to release the auxiliary gear up lock. The gear should not pump gear down at an air speed exceeding 150 M.P.H.

2. In the event of an electrical fire the procedure for combating it is to isolate the system in which you have the fire either by removing the fuse or turning off the switch. If it cannot be quickly determined which system is on fire turn off the battery disconnects and isolate the entire electrical system.

3. The maximum speed at which the bomb bay doors may be opened in flight is 290 M.P.H.

4. The checks made to determine whether both the nose gear and main landing gear wheel are down locked are (1) Landing gear warning horn, (2) Visual, (3) landing gear and wing flap position indicators.

5. The different means of lowering the landing gear are:

- a.) Normal: Move the landing gear handle safety latch and then move the landing gear handle to the position for the desired movement of the gear.
- (b) Emergency Mechanical Operation: Main Landing Gear:
 - (1) Move Pilot's hydraulic landing gear control handle to the down position.
 - (2) Push main landing gear emergency up-position lock pin release located at the right of the lowering screw.
 - (3) Release main landing gear operating screw assembly, which is held to forward wall of radio compartment with finger type screw fastener, rotate assembly away from wall until it locks in position.
 - (4) Turn lowering screw handle until indicator in pilot's compartment registers that the main gear is down and locked.
- Nose Gear: (1) Pilot's hydraulic landing gear control handle in down position.
- (2) Push nose gear emergency up position latch release located above lowering drum housing in the navigator's compartment.
3. Remove safety pin and turn lowering drum

pawl control to "on".

(4) dustall crank, stowed on side of drum housing, and turn crank clockwise until position indicator in pilot's compartment registers that the nose gear is down and locked.

(C.) Emergency Hydraulic Operation: See Sec VI question 1.

6. In the event of an engine fire operate the engine fire extinguisher by setting the valve to "right motor" or "left motor" and then pulling the red handle.

7. The main landing gear down position latches are locked in position in the event they do not lock when gear is lowered normally by:

(1) ~~With~~ With gear fully extended turn emergency hydraulic selector valve to "latch"

(2) Operate hydraulic hand pump until position indicator registers main landing gear lockpins are in place.

8. To release life raft, either pull control in radio operators' compartment, pull control handle in the pilot's compartment above and behind the pilot's seat in some planes and the copilot's seat in others, or pull control on left upper side of fuselage, above trailing edge of wing. The raft is automatically inflated only when released from the radio or pilot's compartment.

9. The other switches on the pilot's control pedestal switch panel besides the ignition safety switch that should be turned off in the event of an emergency are the booster pump switches.
10. An emergency hydraulic shut off valve is located on the left hand side of the radio operators' compartment below the liaison receiver. If a gun charger or connecting line is damaged in action this valve when turned "off" prevents losing hydraulic fluid beyond this valve. In this group there are still some old planes with this shut off valve located in the navigator's compartment.
11. Should the right engine fuel pressure fall below normal turn on the right booster pump and in planes provided with a cross feed it would be good practice to turn it on also.
12. If the nose wheel position indicator shows the nose ~~landing~~ gear fully extended but warning flag shows the down position lock is not engaged it is safe to land if the panel of the nose wheel emergency lowering crank is turned "on" and the gear has been pulled down as far as possible with the emergency crank. Before landing under these conditions, send all available personnel into the tail.
13. There are no warning provisions are made in the B-25 type aeroplane, in the event of a lowering

of the fuel pressure.

14. After the landing gear is down and locked the speed of the aeroplane may be increased to 200 M.P.H.

15. The maximum permissible indicated air speed for the B-25 type series aeroplane is 340 M.P.H.

16. The restrictions against releasing fuselage bombs in a glide or climb vary with the weight^{of} bomb used and the station from which the bomb is released.

17. The stalling speeds for B-25 C-40 aeroplanes with flaps up are

101 MPH	for level flight
134 MPH	" 30° bank
154 MPH	" 60° bank

18. Mechanical operation of the bomb bay doors:—

1. The bomb bay doors will fall approximately two-thirds open when there is no hydraulic pressure regardless of the position of the bomb controls. However, the bomb bay door operating handle must be positioned for the desired movement of the doors before operating the crank.

2. Install bomb bay door operating crank on shaft in aft end of navigator's compartment with the crank positioned downwards. Turn the crank clockwise to open the doors and counter clockwise to close

the doors. The crank incorporates an automatic clutch mechanism which enables it to be operated in either direction and helps to hold the doors in the position to which they are operated.

21. The emergency exits to be used in flight are for the part of the crew in the forward section - the front entrance hatch and for the part of the crew in the rear section - the rear entrance hatch.

22. Location of the following items in the B-25 series airplanes.

- a. Automatic fire extinguisher control - Below instrument panel forward of co-pilot.
- b. CO₂ Hand fire extinguisher. - one in top, front, right side of Navigator's compartment and one in top, rear, right side of radio operator's compartment.
- c. Automatic fire extinguisher lines - run from CO₂ tank in fuselage under co pilot's position out the wings to each nacelle.
- d. Carbon-tet. fire extinguisher - one in out board side of each engine nacelle.
- e. Pilot's life raft release - above and rear of pilot's or sometimes co pilot's seat.
- f. Rear hatch emergency release - on left side of fuselage above hatch.
- g. Medical first aid kit - in pilot's compartment on wooden panel above control column in center of instrument panel or on back of pilot's or co pilot's armor plating, in navigator's compartment ~~to be kept always~~ under the navigator

table to the right of and attached to the same panel as the relief tube or by the fuel transfer pumps. In the bombardier's compartment fastened on the window ledge to the rear of the map case or on the ledge to the rear of the radio selector box. In radio operator's compartment on the panel above the emergency main gear lowering arm to the right of the radio operator's seat and to the rear and above the radio operator's seat on the panel above the window.

- h. Life Raft Stowage - In stowage bin on left side of plane above radio operator's position and in Navigator's compartment on top left side.
- i. Wing flap emergency crank - on wall at front of radio operator's compartment below mechanical main landing gear operating arm.
- j. Emergency bomb bay door crank - stowed on lower right longeron opposite the crank shaft.
- k. Emergency landing gear lowering crank - Main landing gear - on forward wall of radio operator's compartment. Nose gear - crank is stowed on side of drum housing.
- l. Forward hatch emergency release - above forward left corner of hatch.
- m. Hydraulic hand pumps - on floor between pilot and co-pilot seat.
- n. Fuel booster pump switches - on control pedestal switch panel.
- o. Battery disconnect switches - on pilot's switch panel.

- p. Emergency alarm bell switch - on pilots' switch panel.
 - q. Propeller feathering controls - on ~~switch~~ switch panel of control pedestal.
 - r. Emergency air brake lever - on floor between pilot and co-pilot.
 - s. Ignition safety switch - on control pedestal switch panel.
 - t. Emergency hydraulic selector valve - on floor and to the rear between pilot and co-pilot.
 - u. Emergency alarm bells - in bombardier's, radio operator's, and camera operator's compartments.
23. When emergency interphone operation is required the call button position on the jack box should be used. *on #3 position of Command Set*

SECTION VII - FLYING LIMITATIONS

- 1. The manouvers prohibited in the B-25 are: Loop, spin, roll, Immelman, stall, inverted flight, dive & vertical bank.
- 2. The maximum allowable indicated airspeed for a B-25 is 340 M.P.H.
- 3. With landing gear down and wing flaps up 200 M.P.H. is the maximum permissible air speed.
- 4. Power Plant restrictions:
 - a. Maximum engine speed - 2880 R.P.M.
 - b. Minimum idling speed on ground - 450 R.P.M.

- c. The high blower is never used during take off because for the same manifold pressure and RPM settings as in low blower 17% power is lost.
- d. In practice feathering of a propeller while flying, the maximum period of time the propeller is left in the feathered condition is 15 minutes.

SECTION VIII - FLIGHT CONTROLS

1. Location of Flight Controls:

- (1) Aileron - Control Column in Pilot's Compartment.
- (2) Elevator - " " " " "
- (3) Rudder - Rudder pedals " " "
- (4) Aileron Trim - Between pilot's and co-pilot's seats.
- (5) Rudder Trim - " " " " "
- (6) Elevator Trim - Left side of engine control quadrant.
- (7) Wing Flaps - Lower quadrant on control pedestal.
- (8) Emergency Wing Flap Crank - Forward wall of radio Compartment.

2. Name and Location of Power Plant Controls

- (1) Throttle, propeller and mixture - Upper quadrant on pedestal
- (2) Throttle, Propeller, and Mixture Locks - below respective controls
- (3) Propeller Feathering - Control pedestal switch panel.
- (4) Supercharger Blowers - Center quadrant on control pedestal.

- (5) Supercharger Lock - Forward of control -
 - (6) Oil Cooler Shutter - center quadrant on control pedestal -
 - (7) Carburetor Air Heat - Center quadrant on control pedestal -
 - (8) Engine Cowl flaps - Lower quadrant on control pedestal -
 - (9) Starter switches - Control pedestal switch panel.
 - (10) Oil Dilution Switches - Pilot's switch panel.
 - (11) Ignition Switches - Control pedestal switch panel
 - (12) Ignition Safety Switch - Between ignition switches.
 - (13) Generator Main Line Switches - R. rear of navigator's compartment.
 - (14) Generator Voltmeter switch - Right rear of navigator's compartment.
3. The emergency landing gear operating handle is located on the floor between the Pilot and co-pilot's seat.

SECTION IX - LOADING

1. Definitions

a. Basic Weight - weight of plane with all essential equipment installed excluding all variable loads measured in pounds.

b. Basic Moment - Basic Weight multiplied by the basic moment arm (distance in inches from

datum point to Center of gravity) in pound inches.

C. Arm - In this case the distance from the datum point to the force in question measured inches.

C.G. or Center of Gravity - is the point at which the entire mass of the aeroplane can be considered to be concentrated.

c. Basic Index - is the location of the C.G. translated into an index and representing the C.G. location of the empty ~~and~~ aeroplane plus minimum fixed equipment before any variable loads has been added.

2. a) To weigh the plane and get its basic weight you add the readings obtained from the scale under each wheel after the basic plane has been leveled using the leveling lugs in the bomb bay.

b) The basic moment is the sum of the product of the weight ~~upon~~ each wheel and the moment arms from the datum point to the center of the wheel.

c) The distance from the datum point to the C.G. is found by dividing the Basic Moment by the Basic Weight.

3. With a basic weight of 23,500# and a basic moment of 5,687,000 # in ~~the~~ by use of the load adjuster the Basic Index is 26.

4. Given a basic moment of 5,027,000 # in an a basic weight of 20,740 pounds the ^{Basic} index is 29.2

Basic Index 29.2

Given: Basic aeroplane	-----	20,740
974 gal gasoline	-----	6,742
Oil	-----	,315
Bombs	-----	2,500
Nose Compartment - Bombardier	- 200 -	600
Special equipment	- 350	
Handbook Data	- 50	
Pilots' Compartment - Pilots (2)	- 400 -	450
Briefcases	- 50	
Navigator's Compartment - Navigator	- 200 -	700
Arm Chief	- 200	
Special Equip.	- 200	
Nav. & Hdbk Data	100	
Radio, Turret Compartment - Radio operator	200 -	900
Gunner	200	
Special Equipment	200	
Ammo	300	
Rear Entrance Compartment - Photographer	200 -	400
Photographic Equipment	200	
Tail Compartment	-----	100
Gross Weight	-----	33,547

- index comes out as 24.2 and the ship is not loaded properly since the loading passes out of the safe loading range when the fuel has been used down to 340 gals and as more and more fuel is used thereafter the aeroplane will become more and more nose heavy.
6. The max. gross load of the B-25C/D is higher than the max. all. ^{loading} weight.
 7. The forward and rear C.G. limits are at stations 236" and 250" respectively measured from the datum point approx 1.1875 inches ahead of the nose.
 8. When the landing gear ~~is~~ retracted the C.G. moves to the rear and the location of the C.G. expressed as a percentage of Mean Aerodynamic Chord of the Wing increases from 26.8% M.A.C. to 28.9% M.A.C.
 9. Besides the preliminary loading of an aeroplane, using the load adjuster, the pilot must also take into consideration the possibility of crew movement during flight and the loss of bombs and fuel during the flight.
 10. You can safely fill the bomb bay with baggage, keeping the aeroplane within the weight limits and not throwing it outside the C.G. limits.

